

STABILIZING COPPER OVERLAYER FOR ENHANCED C4 INTERCONNECT RELIABILITY

ABSTRACT

Disclosed is an improved integrated circuit structure that has internal circuitry and interconnects (e.g. C4, etc.) on an external portion of the structure. With the invention, these interconnects have a metal layer on the external portion of the structure, a first copper layer on the metal layer, a barrier layer on the copper layer, a stabilizing copper layer on the barrier layer, and a tin-based solder bump on the barrier layer. The stabilizing copper layer has a sufficient amount of copper to balance the chemical potential gradient of copper across the barrier layer and prevent copper within the first copper layer from diffusing across the barrier layer. Alternatively, a sufficient amount of copper can be included within the tin-based solder bump to prevent copper from diffusing across the barrier layer. Thus, the tin-based solder bump comprises a copper rich solder alloy.